Salamander Offshore Wind Farm

Offshore EIA Report

Volume ER.A.4, Annex 12.5: Displacement Assessment

SALAMANDER

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Salamander Offshore Wind Farm: Annex ER.A.4.12.5: Displacement Assessment

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Contents

Tables

Figures

Acronyms and abbreviations

Term	Definition
BTO	British Trust for Ornithology
CEH	Centre of Ecology and Hydrology
MD-LOT	Marine Directorate – Licensing Operations Team
OWF	Offshore Wind Farm
MSP	Mean Seasonal Peak
MD-SEDD	Marine Directorate – Science, Evidence, Data and Digital
MSS	Marine Scotland Science
RSPB	Royal Society for the Protection of Birds
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Body

1 Introduction

1 This Annex supports the assessment of ornithological distributional responses undertaken for the proposed Salamander Offshore Wind Farm (hereafter 'the Salamander Project'). The Salamander Project is a proposed floating offshore wind farm being developed by Salamander Wind Project Company Limited (formerly called Simply Blue Energy (Scotland) Limited), a joint venture between Simply Blue Group, Ørsted and Subsea7.

2 Within this report, the term 'distributional responses' refers to two key responses assessed for seabirds in relation to the presence of offshore wind farms (OWFs): displacement and barrier effects (NatureScot 2023).

3 Displacement is defined as '*a reduced number of birds occurring within or immediately adjacent to an offshore wind farm*' (Furness *et al.,* 2013; Bradbury *et al.,* 2014). This is a direct result of birds avoiding the area of operational turbines and will be species dependent. For species which are less adaptive or have highly localised foraging ranges during the breeding season, any displacement impacts may have the potential to create population level effects. Advice from the UK Statutory Nature Conservation Bodies (SNCBs) (JNCC *et al.*, 2022) considers that both birds in flight and on the water may be displaced.

4 Barrier effects may occur when birds that would have previously flown through an area (e.g. on the way to feeding, resting or nesting areas) either have to cease flying or alter their flight paths due to the presence of an OWF (JNCC *et al.*, 2022), which may affect energetic costs (Masden *et al.,* 2010). For the purpose of this assessment, barrier effects only apply to birds in flight and are considered together with displacement to assess distributional responses.

5 Bradbury *et al.* (2014), Furness *et al.* (2013), Masden *et al.* (2010) and Wade *et al.* (2016) consider the sensitivity of key seabird species to distributional responses. The following species are considered as sensitive or vulnerable to distributional responses and are addressed in this Annex:

- Black-legged kittiwake (*Rissa tridactyla*), hereafter 'kittiwake';
- Common guillemot (*Uria aalge*), hereafter 'guillemot';
- Razorbill (*Alca torda*);
- Atlantic puffin (*Fratercula arctica*), hereafter 'puffin'; and
- Northern gannet (*Morus bassanus*); hereafter 'gannet'.

6 For the above species, Wade *et al.* (2016) assessed the level of uncertainty within estimates of vulnerability to displacement. The level of uncertainty was determined to be low to very low for all species, apart from puffin for which there was moderate uncertainty in vulnerability scores. Presence of key species in site-specific Digital Aerial Surveys (DAS) of the Offshore Array Area is presented alongside density and abundance estimates in Annex ER.A.4.12.1: Offshore Ornithology Baseline Report. Other species, such as red-throated diver (*Gavia stellata*), have also been identified as being susceptible to distributional responses, however, abundance was too low to warrant inclusion in assessment.

7 The matrix method presented within the joint SNCB interim guidance (JNCC *et al.*, 2022), will be used as the primary method of assessment for distributional responses, to provide a prediction of the number of birds which may die following distributional responses, due to the presence of the proposed Salamander Project. Species-specific displacement rates will be applied during analysis; however, any predicted impacts are assumed to cover both displacement and barrier effects to effectively examine

distributional responses as a whole. The use of the matrix method has been confirmed by The Marine Directorate – Licensing Operations Team (MD-LOT) and NatureScot (Scoping Opinion dated 21st June 2023 and NatureScot advice on Scoping Report dated 5th May 2023).

8 Approaches for assessment of distributional responses continue to be developed and informed by the results of post-construction monitoring for operational wind farms. Marine Directorate – Science, Evidence, Data and Digital (MD-SEDD), formerly Marine Scotland Science (MSS), commissioned the Centre of Ecology and Hydrology (CEH) to investigate the effects of potential displacement on key seabird species arising from proposed wind farms in the Forth and Tay. From this work '*investigating the fate of displaced birds*', CEH have built an individual-based model known as 'SeabORD' to model the bio-energetic costs of displacement and barrier effects. SeabORD will be used to provide additional context to determine the extent of distributional responses using the distance decay function (which assumes as distance from colony increases, the density of foraging birds decreases), confirmed by MD-LOT and NatureScot (Scoping Opinion dated 21st June 2023 and NatureScot advice on Scoping Report dated 5th May 2023). The approach is outlined in Annex ER.A.4.12.6: Displacement Assessment SeabORD, and a comparison with outputs using displacement matrices is presented in Section 4.2.

2 Methods

2.1 Displacement matrices

9 The SNCB matrix approach (JNCC *et al.*, 2022) will be primarily used to assess the displacement, and therefore distributional responses, of seabirds to the Salamander Project. Several species-specific parameters were used during assessment:

- Spatial extent – distance from turbines that displacement is likely to affect species;
- Mean seasonal peak population – the mean estimated peak abundance within the impacted area, per season;
- Level of displacement – the percentage of the population assumed to be displaced from the impacted area; and
- Level of mortality – the percentage of displaced birds assumed to die, following displacement.

2.1.1 Spatial scales

10 As advised in the interim joint SNCB guidance (JNCC *et al.*, 2022) and NatureScot (2023), displacement matrices are provided for each of the selected species for the Offshore Array Area (Figure 1; Annex ER.A.4.12.1: Offshore Ornithology Baseline Report) plus the wider zone of influence. For the species of interest, the zone of influence extends to 2km beyond the Offshore Array Area boundary (NatureScot, 2023). Therefore, all displacement matrices will be presented for the Offshore Array Area plus 2km buffer (Figure 1; Annex ER.A.4.12.1: Offshore Ornithology Baseline Report). The buffer is required to account for species which may also be displaced from the area immediately surrounding a wind farm, although displacement is likely to occur to a lesser degree out with the array area compared to inside.

2.1.2 Seasonality

11 The joint interim SNCB guidance (JNCC *et al.*, 2022), requires displacement matrices for each species in the breeding and non-breeding seasons. Both the breeding and non-breeding season definitions follow the NatureScot (2020) guidance (Table 1) and are as follows:

- **Breeding season** – birds strongly associated with nest site, including nesting, egg laying and provisioning young.
- **Non-breeding season** – any period outwith the above, which may encompass birds over-wintering in an area and migration periods between breeding and wintering sites.

12 Following NatureScot guidance (NatureScot, 2023) and advice on the Scoping Report and advice from The Royal Society for the Protection of Birds (RSPB) Scotland the 'migration-free' seasons as defined in Furness (2015) were not used (comments on Scoping Report dated 5th May and 24th April 2023 respectively).

13 The effect of distributional responses on puffin during the non-breeding season are not included. Puffin are assumed to disperse rapidly and widely post-breeding and are therefore assumed to be unlikely to be affected by the presence of the proposed Salamander Project, outside the breeding season.

Table 1 Defined seasons of species being assessed for distributional responses (NatureScot, 2020)

Species	Breeding season	Non-breeding season
Kittiwake	mid Apr – Aug	Sep – mid Apr
Guillemot	Apr – mid Aug	mid Aug – Mar
Razorbill	Apr – mid Aug	mid Aug – Mar
Puffin	Apr – mid Aug	-
Gannet	mid Mar – Sep	Oct – mid Mar

2.1.3 Mean seasonal peaks

14 As advised in the joint interim SNCB guidance (JNCC *et al.*, 2022) and NatureScot (2023), displacement matrices use Mean Seasonal Peak (MSP) population estimates (Table 2). These are an average of peak counts over the two available years of site-specific survey data for each species, calculated for the breeding and non-breeding seasons. For more information please see Annex ER.A.4.12.1: Offshore Ornithology Baseline Report.

Table 2 Mean seasonal peak population estimates of key species per season within the Offshore Array Area plus 2km buffer

Species	Breeding season			Non-breeding season		
	Population estimate	Lower 95% confidence limit	Upper 95% confidence limit	Population estimate	Lower 95% confidence limit	Upper 95% confidence limit
Kittiwake	3718	331	9958	220	19	919
Guillemot	3616	2643	4589	11779	10215	13343
Razorbill	334	198	470	484	112	882
Puffin	357	261	453	-	-	-
Gannet	442	262	622	369	35	922

16 Where seasons started or ended halfway through the month, the 15th was used as a mid-month cut off and surveys were assigned to a season based on the date that the survey was flown (Table 2).

17 All estimates of density and abundance include 'unidentified' birds which have been apportioned to species based on the relative abundance ratios of identified species within each category. For auk species (guillemot, razorbill and puffin), density and abundance estimates have been adjusted to provide absolute estimates (accounting for animals diving at the time of the survey, i.e. adjusting for availability bias). More detail on apportioning of unidentified birds and the calculation of absolute estimates of density and abundance can be found in Annex ER.A.4.12.1: Offshore Ornithology Baseline Report and the two-year DAS report (HiDef, 2023).

2.1.4 Displacement and mortality rates

18 Displacement rates are species-specific, and those used in assessment are presented in Table 3, following the NatureScot (2023) guidance. The advised displacement rates are applied uniformly across the Offshore Array Area plus 2km buffer as described in the SNCB guidance (JNCC *et al.*, 2022) and NatureScot (2023). Section 3.1 summarises outputs solely for the advised displacement rates; the full range of potential displacement rates for each species are reported in the matrices provided in Appendix I: Displacement matrices.

19 The fitness consequences of displacement on birds are two-fold; birds may require higher energetic expenditure deviating from their usual flight or foraging areas, whilst a loss of perceived and physical habitat may reduce available food resources, in turn risking some degree of potential mortality (Fox and Peterson, 2019; Fox *et al.,* 2006; Masden *et al.,* 2009).

20 Mortality risk due to displacement depends on several factors, such as the size of the wind farm, which affects the amount of habitat lost, distance deviated by birds in flight, availability of suitable replacement habitat and, potentially, the level of increased competition. Mortality is also likely to differ with season and species, based on morphology, foraging range, foraging rates and seasonal energetic needs, such as when provisioning for chicks (Masden *et al.,* 2010). Advised mortality rates during the breeding and non-breeding season are also presented in Table 3 (NatureScot, 2023).

21 Displacement and mortality rates presented in Table 3 follow advice received from MD-LOT, NatureScot and RSPB Scotland (Scoping Opinion dated 21st June 2023, RSPB Scotland and NatureScot advice on Scoping Report dated 24th April and 5th May 2023 respectively). Additionally, the Applicant Approach rates are presented in Table 3, these are based on review of recent evidence and monitoring at existing developments. The Applicant Approach is detailed in Volume ER.A.2, Chapter 12: Offshore and Intertidal Ornithology.

Table 3 Displacement and mortality rates included for consideration in assessment as recommended by NatureScot (2023) and Applicant Approach rates (denoted by asterisk)

Species	Percentage of birds displaced	Breeding season mortality	Non-breeding season mortality
Kittiwake	30%*	1%* and 3%	1%* and 3%
Guillemot	60%	3% and 5%	1% and 3%
	50%*	1%*	1%*
Razorbill	60%	3% and 5%	1% and 3%
	50%*	1%*	1%*
Puffin	60%	3% and 5%	-
	50%*	1%*	-
Gannet	70%*	1%* and 3%	1%* and 3%

2.2 SeabORD modelling

22 Following advice from MD-LOT and NatureScot (Scoping Opinion dated 21st June 2023 and NatureScot advice on Scoping Report dated 5th May 2023) SeabORD was used to provide additional contextual information on the effect of the Salamander Project on distributional responses of seabirds (Annex ER.A.4.12.6: Displacement Assessment SeabORD). This has been performed for all species in Table 3, except gannet.

2.2.1 Introduction and scope of SeabORD

23 SeabORD was created by the CEH to quantify the fate of displaced and barrier-affected seabirds during the breeding season (Searle *et al.,* 2014, 2018). It is an individual-based modelling method which predicts the energetic consequences to seabirds due to any changes in their flight paths in the presence of offshore wind farms.

24 The method simulates flightpaths of individual birds from identified breeding colonies to potential foraging areas in scenarios with and without additional wind farm Projects (Searle *et al.,* 2019). Data are fed into bioenergetic equations which estimate percentage body mass loss of the birds, which acts as a measure of survival.

25 Currently the software can be used to predict the impact of potential wind farms for kittiwake, guillemot, razorbill and puffin, each of which is of key concern in the ornithological impact assessment for the Salamander Project. A more detailed technical description of the modelling process is provided in Annex ER.A.4.12.6: Displacement Assessment SeabORD, including the input parameters used.

26 In addition to the Salamander Project, four other wind farms were included in SeabORD scenarios (Table 4): Hywind (latitude: 57.484, longitude: -1.362), European Offshore Wind Deployment Centre (EOWDC) (latitude: 57.227, longitude: -1.997), Kincardine (latitude: 57.007, longitude: -1.853) and Moray Firth wind farms (latitude: 58.164, longitude: -2.873) which comprised Moray Firth East, West and Beatrice (Figure 1). Wind farms are shown in Figure 1 with a 5km buffer as birds displaced from the wind farm boundary area are reassigned to a foraging location within this buffer area.

27 Four seabird colonies within Special Protection Areas (SPAs) were selected for assessment: Troup, Pennan and Lions' Heads SPA, Fowlsheugh SPA, Buchan Ness to Collieston Coast SPA and East Caithness Cliffs SPA (see Annex ER.A.4.12.6: Displacement Assessment SeabORD).

28 As there were no tracking data available for seabirds within these colonies, SeabORD was run using the 'distance decay' function as described in Annex ER.A.4.12.6: Displacement Assessment SeabORD.

Table 4 Location of each SPA and total number of breeding pairs, for input into SeabORD

SPA Colony	Latitude	Longitude	Kittiwake pairs	Guillemot pairs	Razorbill pairs	Puffin pairs
Buchan Ness to Collieston Coast	57.413899	-1.8347168	11295	19666	3901	91
Fowlsheugh	56.91905	-2.19784	14039	46785	9422	89
Troup, Pennan and Lions Heads	57.68208059	-2.25110483	10616	16080	3027	15
East Caithness Cliffs	58.2803	-3.3392	24479	99983	20172	95

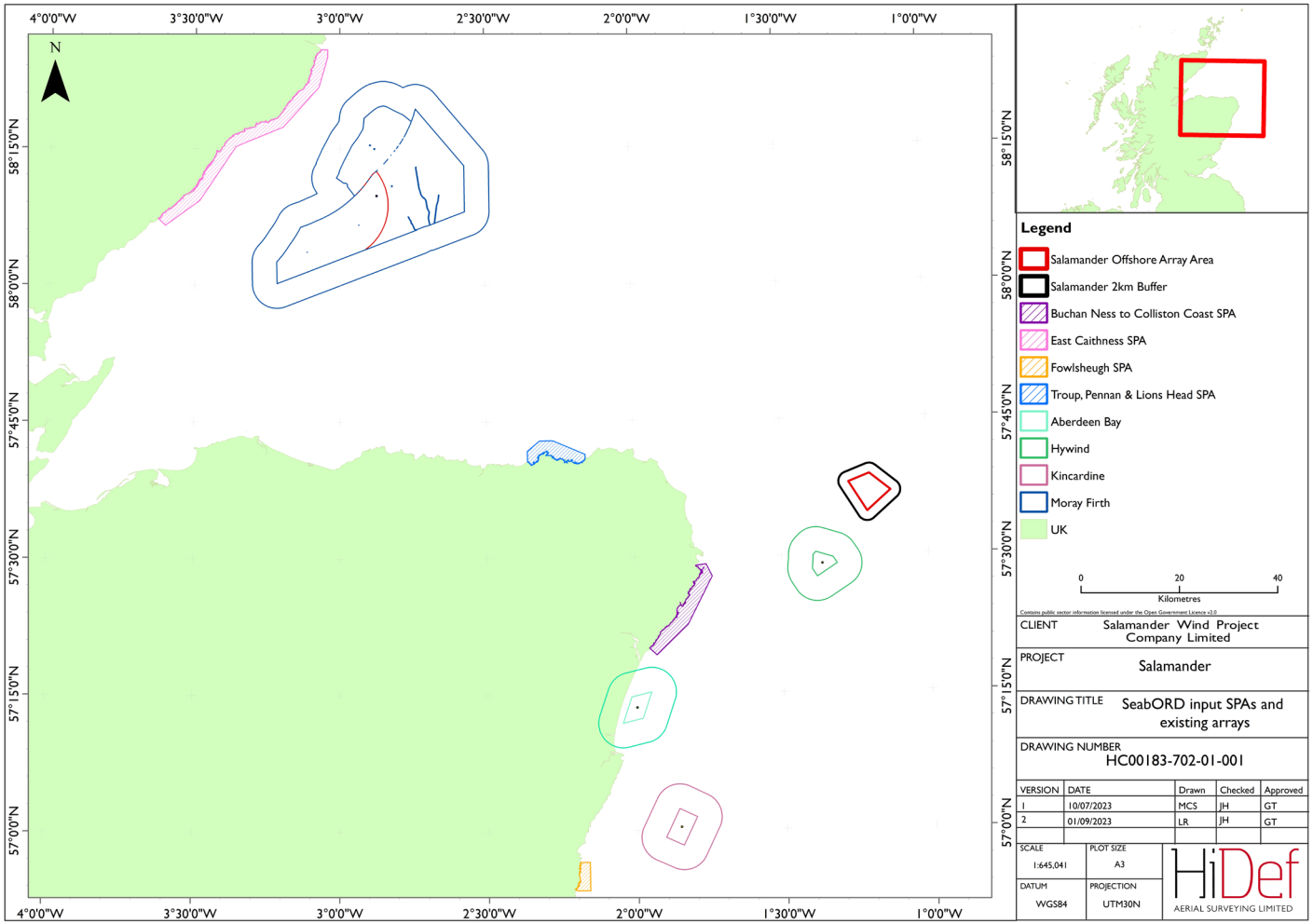

Figure 1 **SPAs and existing arrays with 5km buffers inputted for SeabORD modelling**

3 Results

3.1 Displacement matrices

Table 5 provides estimates of mortality predicted to occur due to distributional responses, as determined by species-specific rates of displacement and mortality. Per species, predicted mortalities are calculated for the Offshore Array Area plus 2km buffer. Predicted mortalities are presented for the breeding and non-breeding seasons, where applicable. As standard practice, these estimates are presented as 'whole birds' and therefore values are rounded up or down, where relevant.

Table 5 Predicted seasonal mortalities from distributional responses (to the nearest whole bird), Applicant Approach rates emboldened

Species	Displacement mortality rates	Breeding season	Non-breeding season
Kittiwake *Breeding MSP - 3,718* *Non-breeding MSP - 220*	**30% / 1%**	**11**	**1**
	30% / 3%	33	2
Guillemot *Breeding MSP – 3,616* *Non-breeding MSP – 11,779*	**50% / 1%**	**18**	**59**
	60% / 1%	-	71
	60% / 3%	65	212
	60% / 5%	108	-
Razorbill *Breeding MSP – 334* *Non-breeding MSP – 484*	**50% / 1%**	**2**	**2**
	60% / 1%	-	3
	60% / 3%	6	9
	60% / 5%	10	-
Puffin *Breeding MSP – 357*	**50% / 1%**	**2**	**-**
	60% / 3%	6	-
	60% / 5%	11	-

Species	Displacement mortality rates	Breeding season	Non-breeding season
Gannet *Breeding MSP – 442* *Non-breeding MSP – 363*	**70% / 1%**	**3**	**3**
	70% / 3%	9	8

3.2 SeabORD model outputs

32 SeabORD model outputs for kittiwake, guillemot, razorbill and puffin are presented in Annex ER.A.4.12.6: Displacement Assessment SeabORD, presented separately for each of the selected SPAs for the Salamander Project Alone and Cumulative (multiple wind farms) scenarios.

4 Discussion and Conclusions

4.1 Consideration of estimated displacement mortalities in assessment

33 This annex provides assessment of estimated mortalities of seabird species arising from distributional responses using displacement matrices (Section 3.1, Appendix I: Displacement matrices) and SeabORD (Section 3.2, Annex ER.A.4.12.6: Displacement Assessment SeabORD). As part of ornithological EIA, the effect of these responses in relation to the regional populations during the breeding and non-breeding season must also be considered.

34 The estimated mortality from distributional responses due to the presence of the Salamander Project on regional seabird populations during the breeding and non-breeding season are presented in Table 6. These are presented per species and per season, in the context of the most recent population counts. Most recent population counts are taken directly from the Seabird Monitoring Programme (SMP) database, hosted by the British Trust for Ornithology (BTO), which can be made available upon request from BTO. For more information on how regional populations were derived for this assessment, and which colonies were included, please see Annex ER.A.4.12.8: Offshore Ornithology Regional Populations Report.

35 Estimated mortality from distributional responses was below 0.1% of the regional populations for all species and seasons, in all scenarios. With the exception of guillemot in both seasons and kittiwake and razorbill in the breeding season, mortality was estimated to affect less than 0.01% of the regional populations. For guillemot, the effect on the regional population was expected to be slightly lower during the breeding season (0.004% using the Applicant Approach of 50% displacement and 1% mortality, or 0.02% and 0.03% using 60% displacement and 3% and 5% mortality rates, respectively) compared to the non-breeding season (0.014% using the Applicant Approach, or 0.02% and 0.05% using 60% displacement and 1% and 3% mortality rates, respectively). For kittiwake, higher mortality was estimated during the breeding season (0.016% of regional population, where the upper recommended mortality rate (3%) is used) while for gannet the impact on regional populations was similar between seasons, but still very low.

Table 6 **Seasonal mortalities to regional populations of key species during the breeding and non-breeding seasons from displacement matrices to the nearest whole bird (and percentage of regional population that represents). Applicant Approach displacement and mortality rates denoted by an asterisk. Calculation of regional populations described in Annex ER.A.4.12.8: Offshore Ornithology Regional Populations Report**

Species	Regional population (individuals)	Displacement mortalities (no. of birds)							
Displacement Rate		30%*		50%*	60%			70%*	
Mortality Rate		1%*	3%	1%*	1%	3%	5%	1%*	3%
Breeding season									
Kittiwake	202258	11 (0.005%)	33 (0.016%)	-	-	-	-	-	-
Guillemot	407959	-	-	18 (0.004%)	-	65 (0.016%)	108 (0.027%)	-	-
Razorbill	70208	-	-	2 (0.003%)	-	6 (0.009%)	10 (0.014%)	-	-
Puffin	287593	-	-	2 (0.001%)	-	6 (0.002%)	11 (0.004%)	-	-
Gannet	432894	-	-	-	-	-	-	3 (0.0007%)	9 (0.002%)
Non-breeding season									
Kittiwake	627816	1 (0.0002%)	2 (0.0003%)	-	-	-	-	-	-
Guillemot	407959	-	-	59 (0.014%)	71 (0.017%)	212 (0.052%)	-	-	-
Razorbill	218622	-	-	2 (0.001%)	3 (0.001%)	9 (0.00%)	-	-	-
Gannet	248385	-	-	-	-	-	-	3 (0.001%)	8 (0.003%)

4.2 Contextual information using SeabORD

36 SeabORD was used to derive contextual information which may be used to further assess the potential impact of distributional responses from the Salamander Project. Scenarios were run for the Salamander Project and for the Salamander Project plus additional wind farms (see Section 2.2). To see complete outputs for all species and scenarios refer to Annex ER.A.4.12.6: Displacement Assessment SeabORD, a summary is provided below.

37 For the Salamander Project Alone simulations for kittiwake, guillemot and razorbill, the additional mortality caused by the presence of the Salamander Project was below 0.1% (Tables 6, 10 and 14; Annex ER.A.4.12.6: Displacement Assessment SeabORD), with puffins not expected to suffer any additional mortality (Table 18; Annex ER.A.4.12.6: Displacement Assessment SeabORD). For all species, the adult survival at the end of the breeding season was 100%, with a negligible difference in chicks not surviving the season with and without the Salamander Project being present (Tables 7, 11, 15, 19; Annex ER.A.4.12.6: Displacement Assessment SeabORD).

38 For kittiwake, guillemot and razorbill in the Cumulative simulations, additional mortality was under 1% at most SPAs (Tables 8, 12, 14; Annex ER.A.4.12.6: Displacement Assessment SeabORD); the greatest additional mortality was estimated at 2% for razorbill at East Caithness Cliffs SPA under poor environmental conditions (Table 14; Annex ER.A.4.12.6: Displacement Assessment SeabORD). Puffin additional mortality was slightly higher than for the other species, although generally, modelled impacts were estimated at under 2% (Table 20; Annex ER.A.4.12.6: Displacement Assessment SeabORD). For all species, adult survival at the end of the breeding season was predicted to be 100%, additional mortality of chicks was never above 10%.

39 Using both the matrix method (JNCC *et al.*, 2022) and SeabORD, estimated mortalities arising from distributional responses are predicted to be low. Direct comparison between displacement matrices and SeabORD is relatively challenging, since the displacement matrices assess the impact in the context of the species-specific regional populations, compared to SeabORD which focuses on the estimated impact on individual SPAs, and specifically those expected to have the greatest impact of all colonies affected given the location of the Salamander Project.

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Annex I: Displacement matrices

Table 7 **Kittiwake breeding season displacement mortalities in the Offshore Array Area plus 2km buffer (to the nearest whole bird), mean value shown with upper and lower 95% confidence limit of the mean in brackets. Coloured cells indicate displacement/mortality levels as recommended by NatureScot. Applicant preferred rates are indicated by bold text**

Kittiwake (mid Apr-Aug)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
Displacement Level (% of all birds on-site)	0%	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
	10%	0 (0, 0)	4 (0, 10)	7 (1, 20)	11 (1, 30)	15 (1, 40)	19 (2, 50)	37 (3, 100)	56 (5, 149)	74 (7, 199)	112 (10, 299)	186 (17, 498)	297 (26, 797)	372 (33, 996)
	20%	0 (0, 0)	7 (1, 20)	15 (1, 40)	22 (2, 60)	30 (3, 80)	37 (3, 100)	74 (7, 199)	112 (10, 299)	149 (13, 398)	223 (20, 597)	372 (33, 996)	595 (53, 1,593)	744 (66, 1,992)
	30%	0 (0, 0)	**11 (1, 30)**	22 (2, 60)	33 (3, 90)	45 (4, 119)	56 (5, 149)	112 (10, 299)	167 (15, 448)	223 (20, 597)	335 (30, 896)	558 (50, 1,494)	892 (79, 2,390)	1,115 (99, 2,987)
	40%	0 (0, 0)	15 (1, 40)	30 (3, 80)	45 (4, 119)	59 (5, 159)	74 (7, 199)	149 (13, 398)	223 (20, 597)	297 (26, 797)	446 (40, 1,195)	744 (66, 1,992)	1,190 (106, 3,187)	1,487 (132, 3,983)

Kittiwake (mid Apr-Aug)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
	50%	0 (0, 0)	19 (2, 50)	37 (3, 100)	56 (5, 149)	74 (7, 199)	93 (8, 249)	186 (17, 498)	279 (25, 747)	372 (33, 996)	558 (50, 1,494)	930 (83, 2,490)	1,487 (132, 3,983)	1,859 (166, 4,979)
	60%	0 (0, 0)	22 (2, 60)	45 (4, 119)	67 (6, 179)	89 (8, 239)	112 (10, 299)	223 (20, 597)	335 (30, 896)	446 (40, 1,195)	669 (60, 1,792)	1,115 (99, 2,987)	1,785 (159, 4,780)	2,231 (199, 5,975)
	70%	0 (0, 0)	26 (2, 70)	52 (5, 139)	78 (7, 209)	104 (9, 279)	130 (12, 349)	260 (23, 697)	390 (35, 1,046)	521 (46, 1,394)	781 (70, 2,091)	1,301 (116, 3,485)	2,082 (185, 5,576)	2,603 (232, 6,971)
	80%	0 (0, 0)	30 (3, 80)	59 (5, 159)	89 (8, 239)	119 (11, 319)	149 (13, 398)	297 (26, 797)	446 (40, 1,195)	595 (53, 1,593)	892 (79, 2,390)	1,487 (132, 3,983)	2,380 (212, 6,373)	2,974 (265, 7,966)
	90%	0 (0, 0)	33 (3, 90)	67 (6, 179)	100 (9, 269)	134 (12, 358)	167 (15, 448)	335 (30, 896)	502 (45, 1,344)	669 (60, 1,792)	1,004 (89, 2,689)	1,673 (149, 4,481)	2,677 (238, 7,170)	3,346 (298, 8,962)
	100%	0 (0, 0)	37 (3, 100)	74 (7, 199)	112 (10, 299)	149 (13, 398)	186 (17, 498)	372 (33, 996)	558 (50, 1,494)	744 (66, 1,992)	1,115 (99, 2,987)	1,859 (166, 4,979)	2,974 (265, 7,966)	3,718 (331, 9,958)

Table 8 **Kittiwake non-breeding season displacement mortalities in the Offshore Array Area plus 2km buffer (to the nearest whole bird), mean value shown with upper and lower 95% confidence limit of the mean in brackets. Coloured cells indicate displacement/mortality levels as recommended by NatureScot. Applicant preferred rates are indicated by bold text**

Kittiwake (Sep – mid Apr)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
Displacement Level (% of all birds on-site)	0%	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
	10%	0 (0, 0)	0 (0, 1)	0 (0, 2)	1 (0, 3)	1 (0, 4)	1 (0, 5)	2 (0, 9)	3 (0, 14)	4 (0, 18)	7 (1, 28)	11 (1, 46)	18 (2, 74)	22 (2, 92)
	20%	0 (0, 0)	0 (0, 2)	1 (0, 4)	1 (0, 6)	2 (0, 7)	2 (0, 9)	4 (0, 18)	7 (1, 28)	9 (1, 37)	13 (1, 55)	22 (2, 92)	35 (3, 147)	44 (4, 184)
	30%	0 (0, 0)	**1 (0, 3)**	1 (0, 6)	2 (0, 8)	3 (0, 11)	3 (0, 14)	7 (1, 28)	10 (1, 41)	13 (1, 55)	20 (2, 83)	33 (3, 138)	53 (5, 221)	66 (6, 276)
	40%	0 (0, 0)	1 (0, 4)	2 (0, 7)	3 (0, 11)	4 (0, 15)	4 (0, 18)	9 (1, 37)	13 (1, 55)	18 (2, 74)	26 (2, 110)	44 (4, 184)	70 (6, 294)	88 (8, 368)
	50%	0 (0, 0)	1 (0, 5)	2 (0, 9)	3 (0, 14)	4 (0, 18)	6 (0, 23)	11 (1, 46)	16 (1, 69)	22 (2, 92)	33 (3, 138)	55 (5, 230)	88 (8, 368)	110 (10, 460)
	60%	0 (0, 0)	1 (0, 6)	3 (0, 11)	4 (0, 17)	5 (0, 22)	7 (1, 28)	13 (1, 55)	20 (2, 83)	26 (2, 110)	40 (3, 165)	66 (6, 276)	106 (9, 441)	132 (11, 551)

Kittiwake (Sep – mid Apr)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
	70%	0 (0, 0)	2 (0, 6)	3 (0, 13)	5 (0, 19)	6 (1, 26)	8 (1, 32)	15 (1, 64)	23 (2, 96)	31 (3, 129)	46 (4, 193)	77 (7, 322)	123 (11, 515)	154 (13, 643)
	80%	0 (0, 0)	2 (0, 7)	4 (0, 15)	5 (0, 22)	7 (1, 29)	9 (1, 37)	18 (2, 74)	26 (2, 110)	35 (3, 147)	53 (5, 221)	88 (8, 368)	141 (12, 588)	176 (15, 735)
	90%	0 (0, 0)	2 (0, 8)	4 (0, 17)	6 (1, 25)	8 (1, 33)	10 (1, 41)	20 (2, 83)	30 (3, 124)	40 (3, 165)	59 (5, 248)	99 (9, 414)	158 (14, 662)	198 (17, 827)
	100%	0 (0, 0)	2 (0, 9)	4 (0, 18)	7 (1, 28)	9 (1, 37)	11 (1, 46)	22 (2, 92)	33 (3, 138)	44 (4, 184)	66 (6, 276)	110 (10, 460)	176 (15, 735)	220 (19, 919)

Table 9 **Guillemot breeding season displacement mortalities in the Offshore Array Area plus 2km buffer (to the nearest whole bird), mean value shown with upper and lower 95% confidence limit of the mean in brackets. Coloured cells indicate displacement/mortality levels as recommended by NatureScot. Applicant preferred rates are indicated by bold text**

Guillemot (Apr- mid Aug)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
Displacement Level (% of all birds on-site)	0%	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
	10%	0 (0, 0)	4 (3, 5)	7 (5, 9)	11 (8, 14)	14 (11, 18)	18 (13, 23)	36 (26, 46)	54 (40, 69)	72 (53, 92)	108 (79, 138)	181 (132, 229)	289 (211, 367)	362 (264, 459)
	20%	0 (0, 0)	7 (5, 9)	14 (11, 18)	22 (16, 28)	29 (21, 37)	36 (26, 46)	72 (53, 92)	108 (79, 138)	145 (106, 184)	217 (159, 275)	362 (264, 459)	579 (423, 734)	723 (529, 918)
	30%	0 (0, 0)	11 (8, 14)	22 (16, 28)	33 (24, 41)	43 (32, 55)	54 (40, 69)	108 (79, 138)	163 (119, 207)	217 (159, 275)	325 (238, 413)	542 (396, 688)	868 (634, 1,101)	1,085 (793, 1,377)
	40%	0 (0, 0)	14 (11, 18)	29 (21, 37)	43 (32, 55)	58 (42, 73)	72 (53, 92)	145 (106, 184)	217 (159, 275)	289 (211, 367)	434 (317, 551)	723 (529, 918)	1,157 (846, 1,468)	1,446 (1,057, 1,836)
	50%	0 (0, 0)	**18 (13, 23)**	36 (26, 46)	54 (40, 69)	72 (53, 92)	90 (66, 115)	181 (132, 229)	271 (198, 344)	362 (264, 459)	542 (396, 688)	904 (661, 1,147)	1,446 (1,057, 1,836)	1,808 (1,322, 2,294)

Guillemot (Apr- mid Aug)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
	60%	0 (0, 0)	22 (16, 28)	43 (32, 55)	65 (48, 83)	87 (63, 110)	108 (79, 138)	217 (159, 275)	325 (238, 413)	434 (317, 551)	651 (476, 826)	1,085 (793, 1,377)	1,736 (1,269, 2,203)	2,170 (1,586, 2,753)
	70%	0 (0, 0)	25 (19, 32)	51 (37, 64)	76 (56, 96)	101 (74, 128)	127 (93, 161)	253 (185, 321)	380 (278, 482)	506 (370, 642)	759 (555, 964)	1,266 (925, 1,606)	2,025 (1,480, 2,570)	2,531 (1,850, 3,212)
	80%	0 (0, 0)	29 (21, 37)	58 (42, 73)	87 (63, 110)	116 (85, 147)	145 (106, 184)	289 (211, 367)	434 (317, 551)	579 (423, 734)	868 (634, 1,101)	1,446 (1,057, 1,836)	2,314 (1,692, 2,937)	2,893 (2,114, 3,671)
	90%	0 (0, 0)	33 (24, 41)	65 (48, 83)	98 (71, 124)	130 (95, 165)	163 (119, 207)	325 (238, 413)	488 (357, 620)	651 (476, 826)	976 (714, 1,239)	1,627 (1,189, 2,065)	2,604 (1,903, 3,304)	3,254 (2,379, 4,130)
	100%	0 (0, 0)	36 (26, 46)	72 (53, 92)	108 (79, 138)	145 (106, 184)	181 (132, 229)	362 (264, 459)	542 (396, 688)	723 (529, 918)	1,085 (793, 1,377)	1,808 (1,322, 2,294)	2,893 (2,114, 3,671)	3,616 (2,643, 4,589)

Table 10 **Guillemot non-breeding season displacement mortalities in the Offshore Array Area plus 2km buffer (to the nearest whole bird), mean value shown with upper and lower 95% confidence limit of the mean in brackets. Coloured cells indicate displacement/mortality levels as recommended by NatureScot. Applicant preferred rates are indicated by bold text**

Guillemot (mid Aug – Mar)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
Displacement Level (% of all birds on-site)	0%	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
	10%	0 (0, 0)	12 (10, 13)	24 (20, 27)	35 (31, 40)	47 (41, 53)	59 (51, 67)	118 (102, 133)	177 (153, 200)	236 (204, 267)	353 (306, 400)	589 (511, 667)	942 (817, 1,067)	1,178 (1,022, 1,334)
	20%	0 (0, 0)	24 (20, 27)	47 (41, 53)	71 (61, 80)	94 (82, 107)	118 (102, 133)	236 (204, 267)	353 (306, 400)	471 (409, 534)	707 (613, 801)	1,178 (1,022, 1,334)	1,885 (1,634, 2,135)	2,356 (2,043, 2,669)
	30%	0 (0, 0)	35 (31, 40)	71 (61, 80)	106 (92, 120)	141 (123, 160)	177 (153, 200)	353 (306, 400)	530 (460, 600)	707 (613, 801)	1,060 (919, 1,201)	1,767 (1,532, 2,001)	2,827 (2,452, 3,202)	3,534 (3,065, 4,003)
	40%	0 (0, 0)	47 (41, 53)	94 (82, 107)	141 (123, 160)	188 (163, 213)	236 (204, 267)	471 (409, 534)	707 (613, 801)	942 (817, 1,067)	1,413 (1,226, 1,601)	2,356 (2,043, 2,669)	3,769 (3,269, 4,270)	4,712 (4,086, 5,337)
	50%	0 (0, 0)	**59 (51, 67)**	118 (102, 133)	177 (153, 200)	236 (204, 267)	294 (255, 334)	589 (511, 667)	883 (766, 1,001)	1,178 (1,022, 1,334)	1,767 (1,532, 2,001)	2,945 (2,554, 3,336)	4,712 (4,086, 5,337)	5,890 (5,108, 6,672)

Guillemot (mid Aug – Mar)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
	60%	0 (0, 0)	71 (61, 80)	141 (123, 160)	212 (184, 240)	283 (245, 320)	353 (306, 400)	707 (613, 801)	1,060 (919, 1,201)	1,413 (1,226, 1,601)	2,120 (1,839, 2,402)	3,534 (3,065, 4,003)	5,654 (4,903, 6,405)	7,067 (6,129, 8,006)
	70%	0 (0, 0)	82 (72, 93)	165 (143, 187)	247 (215, 280)	330 (286, 374)	412 (358, 467)	825 (715, 934)	1,237 (1,073, 1,401)	1,649 (1,430, 1,868)	2,474 (2,145, 2,802)	4,123 (3,575, 4,670)	6,596 (5,720, 7,472)	8,245 (7,151, 9,340)
	80%	0 (0, 0)	94 (82, 107)	188 (163, 213)	283 (245, 320)	377 (327, 427)	471 (409, 534)	942 (817, 1,067)	1,413 (1,226, 1,601)	1,885 (1,634, 2,135)	2,827 (2,452, 3,202)	4,712 (4,086, 5,337)	7,539 (6,538, 8,540)	9,423 (8,172, 10,674)
	90%	0 (0, 0)	106 (92, 120)	212 (184, 240)	318 (276, 360)	424 (368, 480)	530 (460, 600)	1,060 (919, 1,201)	1,590 (1,379, 1,801)	2,120 (1,839, 2,402)	3,180 (2,758, 3,603)	5,301 (4,597, 6,004)	8,481 (7,355, 9,607)	10,601 (9,194, 12,009)
	100%	0 (0, 0)	118 (102, 133)	236 (204, 267)	353 (306, 400)	471 (409, 534)	589 (511, 667)	1,178 (1,022, 1,334)	1,767 (1,532, 2,001)	2,356 (2,043, 2,669)	3,534 (3,064, 4,003)	5,890 (5,108, 6,672)	9,423 (8,172, 10,674)	11,779 (10,215, 13,343)

Table 11 **Razorbill breeding season displacement mortalities in the Offshore Array Area plus 2km buffer (to the nearest whole bird), mean value shown with upper and lower 95% confidence limit of the mean in brackets. Coloured cells indicate displacement/mortality levels as recommended by NatureScot. Applicant preferred rates are indicated by bold text**

Razorbill (Apr- mid Aug)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
Displacement Level (% of all birds on-site)	0%	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
	10%	0 (0, 0)	0 (0, 0)	1 (0, 1)	1 (1, 1)	1 (1, 2)	2 (1, 2)	3 (2, 5)	5 (3, 7)	7 (4, 9)	10 (6, 14)	17 (10, 24)	27 (16, 38)	33 (20, 47)
	20%	0 (0, 0)	1 (0, 1)	1 (1, 2)	2 (1, 3)	3 (2, 4)	3 (2, 5)	7 (4, 9)	10 (6, 14)	13 (8, 19)	20 (12, 28)	33 (20, 47)	53 (32, 75)	67 (40, 94)
	30%	0 (0, 0)	1 (1, 1)	2 (1, 3)	3 (2, 4)	4 (2, 6)	5 (3, 7)	10 (6, 14)	15 (9, 21)	20 (12, 28)	30 (18, 42)	50 (30, 71)	80 (48, 113)	100 (59, 141)
	40%	0 (0, 0)	1 (1, 2)	3 (2, 4)	4 (2, 6)	5 (3, 8)	7 (4, 9)	13 (8, 19)	20 (12, 28)	27 (16, 38)	40 (24, 56)	67 (40, 94)	107 (63, 150)	134 (79, 188)
	50%	0 (0, 0)	**2 (1, 2)**	3 (2, 5)	5 (3, 7)	7 (4, 9)	8 (5, 12)	17 (10, 24)	25 (15, 35)	33 (20, 47)	50 (30, 70)	84 (50, 118)	134 (79, 188)	167 (99, 235)
	60%	0 (0, 0)	2 (1, 3)	4 (2, 6)	6 (4, 8)	8 (5, 11)	10 (6, 14)	20 (12, 28)	30 (18, 42)	40 (24, 56)	60 (36, 85)	100 (59, 141)	160 (95, 226)	200 (119, 282)

Razorbill (Apr- mid Aug)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
	70%	0 (0, 0)	2 (1, 3)	5 (3, 7)	7 (4, 10)	9 (6, 13)	12 (7, 16)	23 (14, 33)	35 (21, 49)	47 (28, 66)	70 (42, 99)	117 (69, 165)	187 (111, 263)	234 (139, 329)
	80%	0 (0, 0)	3 (2, 4)	5 (3, 8)	8 (5, 11)	11 (6, 15)	13 (8, 19)	27 (16, 38)	40 (24, 56)	53 (32, 75)	80 (48, 113)	134 (79, 188)	214 (127, 301)	267 (158, 376)
	90%	0 (0, 0)	3 (2, 4)	6 (4, 8)	9 (5, 13)	12 (7, 17)	15 (9, 21)	30 (18, 42)	45 (27, 63)	60 (36, 85)	90 (53, 127)	150 (89, 212)	240 (143, 338)	301 (178, 423)
	100%	0 (0, 0)	3 (2, 5)	7 (4, 9)	10 (6, 14)	13 (8, 19)	17 (10, 24)	33 (20, 47)	50 (30, 70)	67 (40, 94)	100 (59, 141)	167 (99, 235)	267 (158, 376)	334 (198, 470)

Table 12 **Razorbill non-breeding season displacement mortalities in the Offshore Array Area plus 2km buffer (to the nearest whole bird), mean value shown with upper and lower 95% confidence limit of the mean in brackets. Coloured cells indicate displacement/mortality levels as recommended by NatureScot. Applicant preferred rates are indicated by bold text**

Razorbill (mid Aug - Mar)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
Displacement Level (% of all birds on-site)	0%	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
	10%	0 (0, 0)	0 (0, 1)	1 (0, 2)	1 (0, 3)	2 (0, 4)	2 (1, 4)	5 (1, 9)	7 (2, 13)	10 (2, 18)	15 (3, 26)	24 (6, 44)	39 (9, 71)	48 (11, 88)
	20%	0 (0, 0)	1 (0, 2)	2 (0, 4)	3 (1, 5)	4 (1, 7)	5 (1, 9)	10 (2, 18)	15 (3, 26)	19 (4, 35)	29 (7, 53)	48 (11, 88)	77 (18, 141)	97 (22, 176)
	30%	0 (0, 0)	1 (0, 3)	3 (1, 5)	4 (1, 8)	6 (1, 11)	7 (2, 13)	15 (3, 26)	22 (5, 40)	29 (7, 53)	44 (10, 79)	73 (17, 132)	116 (27, 212)	145 (34, 265)
	40%	0 (0, 0)	2 (0, 4)	4 (1, 7)	6 (1, 11)	8 (2, 14)	10 (2, 18)	19 (4, 35)	29 (7, 53)	39 (9, 71)	58 (13, 106)	97 (22, 176)	155 (36, 282)	194 (45, 353)
	50%	0 (0, 0)	**2 (1, 4)**	5 (1, 9)	7 (2, 13)	10 (2, 18)	12 (3, 22)	24 (6, 44)	36 (8, 66)	48 (11, 88)	73 (17, 132)	121 (28, 220)	194 (45, 353)	242 (56, 441)

Razorbill (mid Aug - Mar)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
	60%	0 (0, 0)	3 (1, 5)	6 (1, 11)	9 (2, 16)	12 (3, 21)	15 (3, 26)	29 (7, 53)	44 (10, 79)	58 (13, 106)	87 (20, 159)	145 (34, 265)	232 (54, 423)	290 (67, 529)
	70%	0 (0, 0)	3 (1, 6)	7 (2, 12)	10 (2, 19)	14 (3, 25)	17 (4, 31)	34 (8, 62)	51 (12, 93)	68 (16, 123)	102 (24, 185)	169 (39, 309)	271 (63, 494)	339 (78, 617)
	80%	0 (0, 0)	4 (1, 7)	8 (2, 14)	12 (3, 21)	15 (4, 28)	19 (4, 35)	39 (9, 71)	58 (13, 106)	77 (18, 141)	116 (27, 212)	194 (45, 353)	310 (72, 564)	387 (90, 706)
	90%	0 (0, 0)	4 (1, 8)	9 (2, 16)	13 (3, 24)	17 (4, 32)	22 (5, 40)	44 (10, 79)	65 (15, 119)	87 (20, 159)	131 (30, 238)	218 (50, 397)	348 (81, 635)	436 (101, 794)
	100%	0 (0, 0)	5 (1, 9)	10 (2, 18)	15 (3, 26)	19 (4, 35)	24 (6, 44)	48 (11, 88)	73 (17, 132)	97 (22, 176)	145 (34, 265)	242 (56, 441)	387 (90, 706)	484 (112, 882)

Table 13 **Puffin breeding season displacement mortalities in the Offshore Array Area plus 2km buffer (to the nearest whole bird), mean value shown with upper and lower 95% confidence limit of the mean in brackets. Coloured cells indicate displacement/mortality levels as recommended by NatureScot. Applicant preferred rates are indicated by bold text**

Puffin (Apr- mid Aug)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
Displacement Level (% of all birds on-site)	0%	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
	10%	0 (0, 0)	0 (0, 0)	1 (1, 1)	1 (1, 1)	1 (1, 2)	2 (1, 2)	4 (3, 5)	5 (4, 7)	7 (5, 9)	11 (8, 14)	18 (13, 23)	29 (21, 36)	36 (26, 45)
	20%	0 (0, 0)	1 (1, 1)	1 (1, 2)	2 (2, 3)	3 (2, 4)	4 (3, 5)	7 (5, 9)	11 (8, 14)	14 (10, 18)	21 (16, 27)	36 (26, 45)	57 (42, 72)	71 (52, 91)
	30%	0 (0, 0)	1 (1, 1)	2 (2, 3)	3 (2, 4)	4 (3, 5)	5 (4, 7)	11 (8, 14)	16 (12, 20)	21 (16, 27)	32 (23, 41)	54 (39, 68)	86 (63, 109)	107 (78, 136)
	40%	0 (0, 0)	1 (1, 2)	3 (2, 4)	4 (3, 5)	6 (4, 7)	7 (5, 9)	14 (10, 18)	21 (16, 27)	29 (21, 36)	43 (31, 54)	71 (52, 91)	114 (84, 145)	143 (104, 181)
	50%	0 (0, 0)	**2 (1, 2)**	4 (3, 5)	5 (4, 7)	7 (5, 9)	9 (7, 11)	18 (13, 23)	27 (20, 34)	36 (26, 45)	54 (39, 68)	89 (65, 113)	143 (104, 181)	178 (130, 226)
	60%	0 (0, 0)	2 (2, 3)	4 (3, 5)	6 (5, 8)	9 (6, 11)	11 (8, 14)	21 (16, 27)	32 (23, 41)	43 (31, 54)	64 (47, 82)	107 (78, 136)	171 (125, 217)	214 (157, 272)

Puffin (Apr- mid Aug)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
	70%	0 (0, 0)	2 (2, 3)	5 (4, 6)	7 (5, 10)	10 (7, 13)	12 (9, 16)	25 (18, 32)	37 (27, 48)	50 (37, 63)	75 (55, 95)	125 (91, 159)	200 (146, 254)	250 (183, 317)
	80%	0 (0, 0)	3 (2, 4)	6 (4, 7)	9 (6, 11)	11 (8, 14)	14 (10, 18)	29 (21, 36)	43 (31, 54)	57 (42, 72)	86 (63, 109)	143 (104, 181)	228 (167, 290)	286 (209, 362)
	90%	0 (0, 0)	3 (2, 4)	6 (5, 8)	10 (7, 12)	13 (9, 16)	16 (12, 20)	32 (23, 41)	48 (35, 61)	64 (47, 82)	96 (70, 122)	161 (117, 204)	257 (188, 326)	321 (235, 408)
	100%	0 (0, 0)	4 (3, 5)	7 (5, 9)	11 (8, 14)	14 (10, 18)	18 (13, 23)	36 (26, 45)	54 (39, 68)	71 (52, 91)	107 (78, 136)	178 (130, 226)	286 (209, 362)	357 (261, 453)

Table 14 **Gannet breeding season displacement mortalities in the Offshore Array Area plus 2km buffer (to the nearest whole bird), mean value shown with upper and lower 95% confidence limit of the mean in brackets. Coloured cells indicate displacement/mortality levels as recommended by NatureScot. Applicant preferred rates are indicated by bold text**

Gannet (mid Mar - Sep)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
Displacement Level (% of all birds on-site)	0%	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
	10%	0 (0, 0)	0 (0, 1)	1 (1, 1)	1 (1, 2)	2 (1, 2)	2 (1, 3)	4 (3, 6)	7 (4, 9)	9 (5, 12)	13 (8, 19)	22 (13, 31)	35 (21, 50)	44 (26, 62)
	20%	0 (0, 0)	1 (1, 1)	2 (1, 2)	3 (2, 4)	4 (2, 5)	4 (3, 6)	9 (5, 12)	13 (8, 19)	18 (10, 25)	27 (16, 37)	44 (26, 62)	71 (42, 100)	88 (52, 124)
	30%	0 (0, 0)	1 (1, 2)	3 (2, 4)	4 (2, 6)	5 (3, 7)	7 (4, 9)	13 (8, 19)	20 (12, 28)	27 (16, 37)	40 (24, 56)	66 (39, 93)	106 (63, 149)	133 (79, 187)
	40%	0 (0, 0)	2 (1, 2)	4 (2, 5)	5 (3, 7)	7 (4, 10)	9 (5, 12)	18 (10, 25)	27 (16, 37)	35 (21, 50)	53 (31, 75)	88 (52, 124)	141 (84, 199)	177 (105, 249)
	50%	0 (0, 0)	2 (1, 3)	4 (3, 6)	7 (4, 9)	9 (5, 12)	11 (7, 16)	22 (13, 31)	33 (20, 47)	44 (26, 62)	66 (39, 93)	110 (66, 156)	177 (105, 249)	221 (131, 311)

Gannet (mid Mar - Sep)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
	60%	0 (0, 0)	3 (2, 4)	5 (3, 7)	8 (5, 11)	11 (6, 15)	13 (8, 19)	27 (16, 37)	40 (24, 56)	53 (31, 75)	80 (47, 112)	133 (79, 187)	212 (126, 299)	265 (157, 373)
	70%	0 (0, 0)	**3 (2, 4)**	6 (4, 9)	9 (6, 13)	12 (7, 17)	15 (9, 22)	31 (18, 44)	46 (28, 65)	62 (37, 87)	93 (55, 131)	155 (92, 218)	248 (147, 348)	309 (183, 435)
	80%	0 (0, 0)	4 (2, 5)	7 (4, 10)	11 (6, 15)	14 (8, 20)	18 (10, 25)	35 (21, 50)	53 (31, 75)	71 (42, 100)	106 (63, 149)	177 (105, 249)	283 (168, 398)	354 (210, 498)
	90%	0 (0, 0)	4 (2, 6)	8 (5, 11)	12 (7, 17)	16 (9, 22)	20 (12, 28)	40 (24, 56)	60 (35, 84)	80 (47, 112)	119 (71, 168)	199 (118, 280)	318 (189, 448)	398 (236, 560)
	100%	0 (0, 0)	4 (3, 6)	9 (5, 12)	13 (8, 19)	18 (10, 25)	22 (13, 31)	44 (26, 62)	66 (39, 93)	88 (52, 124)	133 (79, 187)	221 (131, 311)	354 (210, 498)	442 (262, 622)

Table 15 **Gannet non-breeding season displacement mortalities in the Offshore Array Area plus 2km buffer (to the nearest whole bird), mean value shown with upper and lower 95% confidence limit of the mean in brackets. Coloured cells indicate displacement/mortality levels as recommended by NatureScot. Applicant preferred rates are indicated by bold text**

Gannet (Oct – mid Mar)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
Displacement Level (% of all birds on-site)	0%	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)
	10%	0 (0, 0)	0 (0, 1)	1 (0, 2)	1 (0, 3)	1 (0, 4)	2 (0, 5)	4 (0, 9)	6 (1, 14)	7 (1, 18)	11 (1, 28)	18 (2, 46)	30 (3, 74)	37 (4, 92)
	20%	0 (0, 0)	1 (0, 2)	1 (0, 4)	2 (0, 6)	3 (0, 7)	4 (0, 9)	7 (1, 18)	11 (1, 28)	15 (1, 37)	22 (2, 55)	37 (4, 92)	59 (6, 148)	74 (7, 184)
	30%	0 (0, 0)	1 (0, 3)	2 (0, 6)	3 (0, 8)	4 (0, 11)	6 (1, 14)	11 (1, 28)	17 (2, 41)	22 (2, 55)	33 (3, 83)	55 (5, 138)	89 (8, 221)	111 (11, 277)
	40%	0 (0, 0)	1 (0, 4)	3 (0, 7)	4 (0, 11)	6 (1, 15)	7 (1, 18)	15 (1, 37)	22 (2, 55)	30 (3, 74)	44 (4, 111)	74 (7, 184)	118 (11, 295)	148 (14, 369)
	50%	0 (0, 0)	2 (0, 5)	4 (0, 9)	6 (1, 14)	7 (1, 18)	9 (1, 23)	18 (2, 46)	28 (3, 69)	37 (4, 92)	55 (5, 138)	92 (9, 230)	148 (14, 369)	184 (18, 461)
	60%	0 (0, 0)	2 (0, 6)	4 (0, 11)	7 (1, 17)	9 (1, 22)	11 (1, 28)	22 (2, 55)	33 (3, 83)	44 (4, 111)	66 (6, 166)	111 (11, 277)	177 (17, 443)	221 (21, 553)

Gannet (Oct – mid Mar)		Mortality Level (% of displaced birds that die)												
		0%	1%	2%	3%	4%	5%	10%	15%	20%	30%	50%	80%	100%
	70%	0 (0, 0)	**3 (0, 6)**	5 (0, 13)	8 (1, 19)	10 (1, 26)	13 (1, 32)	26 (2, 65)	39 (4, 97)	52 (5, 129)	77 (7, 194)	129 (12, 323)	207 (20, 516)	258 (25, 645)
	80%	0 (0, 0)	3 (0, 7)	6 (1, 15)	9 (1, 22)	12 (1, 30)	15 (1, 37)	30 (3, 74)	44 (4, 111)	59 (6, 148)	89 (8, 221)	148 (14, 369)	236 (22, 590)	295 (28, 738)
	90%	0 (0, 0)	3 (0, 8)	7 (1, 17)	10 (1, 25)	13 (1, 33)	17 (2, 41)	33 (3, 83)	50 (5, 124)	66 (6, 166)	100 (9, 249)	166 (16, 415)	266 (25, 664)	332 (32, 830)
	100%	0 (0, 0)	4 (0, 9)	7 (1, 18)	11 (1, 28)	15 (1, 37)	18 (2, 46)	37 (4, 92)	55 (5, 138)	74 (7, 184)	111 (10, 277)	184 (18, 461)	295 (28, 738)	369 (35, 922)